

KINETICS OF ELECTROMIGRATION FAILURE IN NARROW AL INTERCONNECTS

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Recent studies have shown that the electromigration failure in narrow interconnects occurs primarily at the sections with the longest polygranular segment. This result suggests that the proper control of grain structure, which can effectively reduce the length of polygranular segments, would enhance the reliability of the interconnects. We attempt to simulate such an effect by using pure Al and Al-2Cu. Lines with 1 μm in width were prepared and annealed for different times at 480°C to obtain various initial microstructures. Each test sample was then subjected to the same electromigration testing conditions for the purpose of comparison. It was found that the length of a polygranular segment determines the kinetics of failure, while the distribution of such segments influences the statistics of lifetime. We believe that the results obtained in this investigation would lead to an effective way to enhance the reliability of narrow interconnects. We will address the scientific basis for such a technique.

This work was supported by the Director, Office of Energy Research, Office of Basic Energy Sciences, U.S. Department of Energy, under Contract No. DE-AC03-76SF00098 and under contract W-7405-Eng-48 at Lawrence Livermore National Laboratory.